

The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

## Sources of Exposure

### General Populations

- The general population is not likely to receive high exposures of acrolein.
- May be exposed through inhalation of contaminated air, cigarette smoke, and through ingestion of certain foods.
- Widespread exposure occurs due to the formation of acrolein during the heating of fats.
- May be exposed to high concentrations from vehicle exhaust (for example, parking garages and/or heavy traffic).

### Occupational Populations

- Potential for exposure during the combustion and pyrolysis of materials such as wood, petrochemical fuels, and plastics.
- Some occupations in which exposure to acrolein may occur include workers involved in the production of acrylates, methionine, perfumes, plastics, refrigerants, rubber, or textile resins.
- Workers involved in welding or heating painted metal may be exposed to acrolein.
- Firefighters are at risk to exposure to acrolein when battling house fires and wild fires.

## Toxicokinetics and Normal Human Levels

### Toxicokinetics

- No toxicokinetic studies were located regarding human exposure to acrolein.
- Acrolein uptake by anesthetized dogs exposed to 172-262 ppm (1-3 minutes), ventilatory rates of 6-20 respirations/minute, averaged 80-85% of the inhaled dose.
  - An acrolein metabolite was identified in the urine of rats given a single dose of 10 mg/kg acrolein.
  - No studies were located regarding metabolism in humans after exposure to acrolein. In cell systems in vitro, acrolein has been shown to form conjugates with glutathione, cysteine, N-acetylcysteine and/or thioredoxin.

### Normal Human Levels

- No data available.

## Biomarkers / Environmental Levels

### Biomarkers

- No studies were located regarding levels of acrolein or its metabolites in human tissues and fluids associated with effects.
- No biochemical or historical changes specific for acrolein exposure were identified.

### Environmental Levels

#### *Air*

- Average range: 0.3 to 2.048 ppb carbon (0.5- 3.186 ppbv).
- Maximum range: 0.3 to 3.6 ppb carbon (0.5-5.6 ppbv).

#### *Sediment and Soil*

- No data are available on actual measurements of acrolein in soil.

#### *Water*

- Acrolein has not been found as a contaminant of drinking water.
- In landfill leachate, ranged from 2.1 to 234 ppm.
- In groundwater at hazardous waste sites, ranged from 1.3 to 75 ppm.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Acrolein (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.



# ToxGuide™ for Acrolein $\text{CH}_2=\text{CH}-\text{CHO}$

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U.S. Department of Health and  
Human Services  
Public Health Service  
Agency for Toxic Substances  
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**ATSDR**  
AGENCY FOR TOXIC SUBSTANCES  
AND DISEASE REGISTRY

## Chemical and Physical Information

### Acrolein is a liquid

- Acrolein is a clear or yellow liquid with a disagreeable odor.
- Burns easily.
- Changes into a vapor much faster than water does at normal temperatures.
- When heated to high temperatures, can change into a vapor very quickly.
- Acrolein is an irritant that affects the eyes, respiratory system, gastrointestinal system, and skin if it comes into contact with them.
- Acrolein is used to make other chemicals and pesticides.
- Acrolein can be formed and can enter the air when organic matter such as trees and other plants, including tobacco, are burned and also when fuels such as gasoline and oil are burned.
- Acrolein is formed when fats are heated.

## Routes of Exposure

- Inhalation (breathing) - The predominant route of environmental exposure is inhalation of smoke or automotive exhaust.
- Oral (mouth) - Small amounts of acrolein may be found in certain foods (fried foods, cooking oils, and roasted coffee), but the amount in the food you eat is not known. No significant acrolein exposure is expected from ingestion of drinking water.

### Acrolein in the Environment

- Acrolein is added to irrigation canals to remove underwater plants.
- Acrolein does not stay in air or water very long.
- Acrolein that enters the air as a vapor changes into other chemicals within days.
- Dissolves easily in water.
- Within days, some of the acrolein in water changes into a vapor and enters the air.
- Acrolein left in the water is changed into other chemicals, which are rapidly broken down.
- Acrolein that enters the soil can either change into vapor and enter the air, be washed out in water, or be oxidized.
- Near hazardous waste sites, in which acrolein is not properly stored, acrolein might be found in the air, water, or soil.
- Acrolein is not commonly found in surface waters such as lakes and streams.

## Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

### Minimal Risk Levels (MRLs)

#### Inhalation

- Acute-duration = 0.003 ppm.
- Intermediate-duration = 0.00004 ppm.

#### Oral

- Intermediate-duration = 0.008 mg/kg/day.

### Health Effects

#### Respiratory

- Nasal irritation appears to be the most sensitive respiratory effect.
- Acrolein may affect the entire respiratory tract, from the nasal epithelium to the alveolar spaces.
- In general, individuals with emphysema or allergic conditions such as asthma, will be at a higher risk of developing adverse respiratory responses when exposed to a strong respiratory irritant such as acrolein.

#### Gastrointestinal

- Irritation of gastrointestinal mucosa appears to be the primary effect of oral exposure to acrolein.
- Oral acrolein exposure may result in gastrointestinal discomfort, vomiting, and stomach ulceration and/or hemorrhage.

### Children's Health

- Largest source of acrolein exposure for children living with individuals who smoke is through inhalation of environmental tobacco smoke (ETS).
- For children without exposure to ETS, their main exposures to acrolein are expected to be similar to the general population.
- In general, children are not likely to be affected by acrolein more than adults.